The Effect of Discovery Learning Model on Learning Outcomes of Science XI Class Students on Plant Tissue Material

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ARTICLE INFO

ABSTRACT

The purpose of learning is certainly in the form of good learning outcomes, and its implementation is usually influenced by several major factors from the teacher when choosing a learning strategy or model. So that research was conducted related to the effect of the discovery learning model on the learning outcomes of students in class XI IPA on plant tissue material. This research is a type of quasi-experimental research, and this research was conducted to see whether or not there is an effect of the application of the discovery learning model on the learning outcomes of students in class XI IPA on plant tissue material. The population used in this study was all students of class XI IPA 1, 4, 5, and 6, totaling 117 students. The data sampling technique at the time of the research was purposive sampling. There are two data collection techniques used in this study, namely: (1) written tests, namely by giving a pretest before learning and a posttest after learning, (2) the non-test technique is observation. Based on the results of the normality and homogeneity tests, the results showed that the data were not normally distributed because the Sig value on Kolmogorov-Smirnov was $0.00 < 0.05$ and not homogeneous. After all, the homogeneity test results showed the result of 0.00, which was < 0.05. Because the data obtained were not normally distributed and not homogeneous, it was continued with the nonparametric test, namely the Wilcoxon test. Based on the results of the Wilcoxon test, the Asymp. Sig. (2-tailed) is 0.000. Because 0.000 is smaller than 0.05, it can be concluded that the hypothesis is accepted. This means that there is an effect of the discovery learning model on the learning outcomes of class XI students in studying plant tissue material.

Introduction

Learning is a process of interaction between teachers and learners in order to achieve learning objectives. Learning refers to the active interaction of students and educators in the learning process in the classroom. While the term teaching and learning still connotes teacher centered where this term is no longer relevant to the concept of learning that requires a student center (Djalal, 2017). The success of achieving learning objectives is largely influenced by the teacher, because the teacher not only conveys learning, but has a greater role, a teacher must be able to

guide students who are growing and developing both attitudes, physical and psychological. In the learning process, the teacher must be able to make the atmosphere of teaching and learning activities interesting, so that students have a greater sense of curiosity and are not easily bored. Given the enormous responsibility carried by a teacher, a teacher must realize that as a teacher who is the spearhead who is expected to achieve educational success, the teacher must continue to update models, techniques, and strategies in learning to adapt to the times. (Wulandari et al., 2023). There are various factors that affect the course of learning, one of which is the psychological factors of students. These psychological factors include learners' attention or interest and learners' motivation in learning. This requires a learning model that can increase students' interest in learning. (Kahfi et al., 2021).

The learning model is a design pattern that can be used to form a curriculum (lesson plan), so that teaching and learning activities are maximized and so is the achievement of their goals. (Dari & Ahmad, 2020). It is known that by using a learning model properly, we will know the model that has been designed by the teacher which is applied to students, we will know the nature of students, we can know the shortcomings and advantages of the model that has been designed by the teacher.(Khoerunnisa & Aqwal, 2020). Learning models are generally made using the basic principles and theories of knowledge from experts. It can be seen that the world of education always evaluates and improves in its development, as well as learning models that continue to be analyzed and evaluated in each application. Another opinion also states that the learning model is a form of learning that is described from beginning to end which is presented characteristically by the teacher (Zagoto, 2022).Based on this opinion, in addition to being a characteristic of a teacher, the learning model is also chosen with great consideration from the teacher based on the situation, conditions and many other things.

Method

The type of research used in this study is a type of quasi-experimental research. The research design used is pretest posttest Group Design, which is research carried out in one group only without a comparison group which is given an initial test (pretest) before being given treatment and then given a final test (posttest) after being given treatment. In this study, the independent variable is the response to the Discovery Learning model and the dependent variable in this study is the learning outcomes of students of class XI SMAN 5 Yogyakarta.

The data sampling technique at the time of the research used was purposive sampling, which is a sampling technique with certain considerations. This is because the sample uses 4 classes in SMA N 5 Yogyakarta. There are two data collection techniques used in this study, namely: (1) written tests, namely by giving a pretest before learning and posttest after learning, (2) non-test techniques, namely observation.

Data analysis was carried out using the help of the SPSS version 25 device. The first step taken was to conduct a normality test and homogeneity test. Both tests aim to determine whether the pretest posttest data obtained is normally

distributed and homogeneous. The results are analyzed using the t test (two paired sample test) if all data is normal. If after testing the data is declared abnormal, a non-parametric test is used, namely the Wilcoxon test. According to Pratiwi & Alimuddin (2018) The Wilcoxon test is a substitute for the t test to test the difference between two means in parametric statistics. The wilcoxon test is a non-parametric test that is used if in the data normality test there is one of the data or both are not normally distributed. Decision making on the wilcoxon test is if the Asymp. Sig. (2-tailed) is less than or equal to 0.005 then Ho is rejected or there is a difference before and after treatment. If the value of Asymp. Sig. (2-tailed) is more than 0.005 then Ho is accepted or there is no difference before and after treatment.

Results and Discussion

Table 1. Description of the Acquisition of Pretest and Posttest Results

Descriptive Statistics

	N	Minimum	Maximum	Mean	Std. Deviation
nilai pretest	117	10.00	80.00	53.2479	16.41746
nilai postest	117	40.00	95.00	79.6154	9.07711
Valid N (listwise)	117				

Table 2. Prerequisite Test Using Normality Test

Tests of Normality

	nilai kelas	Kolmogorov-Smirnov[a]			Shapiro-Wilk		
		Statistic	df	Sig.	Statistic	df	Sig.
hasil belajar	pretest	.122	117	.000	.956	117	.001
	posttest	.175	117	.000	.886	117	.000

a. Lilliefors Significance Correction

Table 3. Prerequisite Test Using Homogeneity Test

Test of Homogeneity of Variance

		Levene Statistic	df1	df2	Sig.
hasil belajar	Based on Mean	58.495	1	232	.000
	Based on Median	53.073	1	232	.000
	Based on Median and with adjusted df	53.073	1	207.724	.000
	Based on trimmed mean	57.551	1	232	.000

Table 4. Nonparametric Follow-Up Test Using the Wilcoxon Test

Ranks

		N	Mean Rank	Sum of Ranks
nilai postest - nilai pretest	Negative Ranks	4[a]	17.50	70.00
	Positive Ranks	99[b]	53.39	5286.00
	Ties	14[c]		
	Total	117		

a. nilai postest < nilai pretest

b. nilai postest > nilai pretest

c. nilai postest = nilai pretest

Table 5. Wilcoxon Statistical Test

Test Statistics[a]

	nilai postest - nilai pretest
Z	-8.591[b]
Asymp. Sig. (2-tailed)	.000

a. Wilcoxon Signed Ranks Test

b. Based on negative ranks.

Based on table 1, it can be seen that the average value on the pretest is 53.2, while the average value on the posttest is 79.6. This shows an increase in the value of students. This means that it shows the effectiveness of the learning model in improving student learning outcomes. According to kadri & meika (2015) With this model, students can work together in groups. The level of understanding obtained by students is deeper because students are directly involved in the process of finding answers to existing problems and directly practicing them so that the learning process is more effective and efficient.

Based on tables 2 and 3, data analysis begins with conducting prerequisite tests, namely normality test and homogeneity test. According to wahyuni et al (2020) Normality test aims to determine whether the research data comes from a normally distributed population or not. Data is said to be normally distributed if it has a significance value> 0.05. The normality test that can be used is Kolmogorov-Smirnov. Another prerequisite test is the homogeneity test. According to prasetyo & kristin (2020) Homogeneity test is conducted to ensure that the result data has homogeneous variance. Data results are said to be homogeneous if they have a significance value> 0.05. According to usmadi (2020) The homogeneity of variance test is needed before comparing two or more groups, so that the differences are not caused by differences in basic data. The prerequisite test results obtained can be seen that the normality test also has a significance value of 0.000. Because 0.000 is smaller than 0.05, it can be concluded

that the pretest and posttest data are not normally distributed and not homogeneous. This causes the data cannot be further analyzed using parametric tests, but analyzed using nonparametric tests. According to quraisy (2022) Nonparametric tests are statistical tests that do not require a specific data distribution for the population to be tested nor specific parameter values. Various nonparametric tests that can be performed are the mann-whitney test (u test), kruskal-wallis test, wilcoxon test, and friedman test.

The further test used in this study is a non-parametric test using the Wilcoxon test. According to windi et al (2022) The Wilcoxon test is an alternative to the paired student t test when the population cannot be assumed to be normally distributed or the data is on an ordinal scale. The wilcoxon test aims to test comparisons between observations before and after (before after) given treatment and determine the effectiveness of a treatment. The results obtained that on the negative rank show that there are 4 students who experience a decrease in value, because the posttest value is greater than the pretest value. The average decrease in value is 17.5. Positive rank shows that there are 99 learners experiencing an increase in value, because the pretest value is greater than the posttest value. The average increase in value is 53.39. Ties show that there are 14 scores that have the same pretest and posttest scores.

Based on the statistical test results, it is known that the Asymp. Sig. (2-tailed) is 0.000. Because 0.000 is smaller than 0.05, it can be concluded that the hypothesis is accepted. This means that there is an effect of the discovery learning model on learning outcomes. (Rudianto et al., 2020) He also stated that the Discovery Learning model will have good results if

applied appropriately and considering the material to be delivered. It also shows that students can understand the material well when learning by using the discovery learning model because most students experience an increase in posttest scores after participating in the learning. Based on the observations made, it shows that students are interested in learning in class and pay attention to instructions from the teacher. Learners are also diligent by collecting assignments on time as directed by the teacher. Clarified again by Melati et al (2020) that the application of the Discovery Learning model in learning, students actually look excited and active during the learning process where students are required to think critically, investigate, find their own answers to problems given by the teacher, and become independent learners, where students are posed with problems to stimulate students' curiosity. This learning model has a syntax that can increase the curiosity of students by finding their own things that are not understood or constructing the initial understanding that has been obtained.

Conclusion

The application of the Discovery Learning model can improve student learning outcomes and student interest in learning. Based on the results of the normality and homogeneity tests, the results showed that the data was not normally distributed because the sig value on Kolmogorov-Smirnov was 0.00 <0.05 and was not homogeneous because the homogeneity test results showed a result of 0.00 which was <0.05. Because the data obtained is not normally distributed and not homogeneous, it is continued with the nonparametric test, namely the Wilcoxon test. Based on the results of the Wilcoxon test, the value of Asymp. Sig. (2-tailed) is 0.000. Because 0.000 is smaller than 0.05, it can be concluded that the hypothesis is

accepted. This means that there is an effect of the discovery learning model on the learning outcomes of class XI students in studying plant tissue material.

Acknowledgement

All praise is due to God Almighty, because with His blessings and grace, I can complete this scientific paper. The writing of this scientific paper was carried out in order to fulfill the output task of the PLP II activity of the Factual of Teacher Training and Science of Ahmad Dahlan University. Our gratitude also goes to the principal of SMA N 5 Yogyakarta and the tutor who has received us and provided a lot of guidance that really helped us when implementing PLP II and also for us in the future. Thank you to the Field Supervisor and Field Coordinator Lecturer who have helped us in all the processes of implementing PLP II activities until the preparation of this scientific paper.

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